

Application No. 09/847,605
Amendment dated January 25, 2005
Reply to Office Action of October 25, 2004
Attorney Docket No. DP-302846

REMARKS/ARGUMENTS

Claims 1-10 and 23-29 are pending in the present application. Claims 11-22 have been withdrawn. In view of the Examiner's earlier restriction requirement, Applicants retain the right to present Claims 11-22 and not yet claimed subject matter in one or more divisional applications. Claims 1-10 and 23-29 have been rejected.

Claims 1 and 23 have been amended. Claims 30-33 have been added. Support for the claim amendments can be found, for example at page 7, lines 1-10 and page 7, line 28 through page 8, line 2, and elsewhere throughout the specification. Upon entry of the present Amendment, Applicants believe Claims 1-10 and 23-33 and are in condition for allowance.

Applicants respectfully request reconsideration of the Examiner's objection to the amendment filed 08/10/04. The added paragraphs inserted after the paragraph ending on line 27 of page 8 and configurations shown in the FIGS. 5-18 are encompassed and supported within the application as filed. The embodiments shown in FIGS. 5-19 are variations on the same concept disclosed in the application as filed. That is, that application as filed discloses that Applicants had in their possession at the time of filing an interconnect for fuel cell elements comprising solid oxide electrolyte, an anode, and a cathode, wherein said interconnect comprises a single conductive base sheet having first and second faces on opposite sides of said base sheet; anode gas flow passages disposed on said first face of said base sheet said anode gas flow passages being configured with a first unique anode gas flow passage geometry comprising a depth and pattern selected to optimize fuel gas flow across the interconnect; cathode gas flow passages disposed on said second face of said base sheet said cathode gas flow passages being configured with a second unique cathode gas flow passage geometry that is different from the anode gas flow passage geometry, the cathode gas flow passage

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geometry comprising a depth and pattern selected to optimize oxidant gas flow across the interconnect (see, for example, the instant application at p. 5, lines 6-11).

Embodiments and configurations comprising disposition of different geometric configurations on the anode and cathode faces is disclosed throughout the application as filed. Flow passage depth and pattern intricacy is selected for each side, anode and cathode, providing optimum flow channel geometry for the different flow requirements. See, for example, the instant application at p. 7, lines 1-10.

Specific functions for the anode and cathode flow passage geometries are taught in the original disclosure. Selecting flow passage depth and pattern intricacy for the anode and cathode flow passages encompasses providing variations in flow direction, velocity, and turbulence designed to affect fuel utilization across the plane of the cell as fuel concentration changes and to enhance transport of reaction products. For example, in embodiments, the cathode gas flow passages are configured to provide deep flow passages to promote oxidant mixing and a large surface area for optimum heat transfer to the cathode gas stream (see the instant application at p. 5, lines 2-5). Anode side geometry is selected to provide, for example, flow passages allowing high swirl for optimum mixing of the fuel gas in combination with low pressure drop (see the instant application at p. 8, lines 12-15)

The invention is not limited to a flow passage having a particular number of sections on either the anode or cathode side. Variations on the distinct anode and cathode flow passage configurations are included within the scope of the invention. The geometry of the gas flow passages can be extremely detailed with fine features for optimizing anode gas flow, or features that vary across the interconnect to compensate for fuel gas concentration changes and temperature changes of the anode gas as it flows across the fuel cell (see the instant application at p. 7, line 28 to page 8, line 2).

Claims 1-9, 23-24, and 28-29 have been rejected under 35 USC 103(a) as

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being unpatentable over Badwal et al. (U.S. Patent 6,280,868) in view of Ruhl et al. (U.S. Patent 6,361,892). Badwal does not teach or suggest the present claim elements of a single conductive base sheet having opposing first and second faces, the first face having anode gas flow passages disposed thereon, the anode gas flow passages being configured with a first unique anode gas flow passage geometry comprising a depth and pattern selected to optimize fuel gas flow across the interconnect; and the second face having cathode gas flow passages disposed thereon, the cathode gas flow passages being configured with a second unique cathode gas flow passage geometry that is different from the anode gas flow passage geometry, the cathode gas flow passage geometry comprising a depth and pattern selected to optimize oxidant gas flow across the interconnect. Badwal further does not teach or suggest anode or cathode gas flow passage geometry comprising a depth and pattern that varies across the interconnect as presently disclosed and claimed.

Badwal does not provide a unique and distinctive surface geometry for each of the anode and cathode gas flow passages. Badwal teaches the same geometry for both fuel and oxidant passages. Badwal does not describe the size or shape of the identical fuel and oxidant gas flow channels except to say that the channels may be parallel or perpendicular (Column 5, lines 15-37). Cleaning the surfaces of the identical anode and cathode passages taught in Badwal does not impart a unique geometry to each side. Further, forming a fuel cell stack with interconnects having identical gas flow passage geometry on both the anode and cathode side, does not result in imparting a unique geometry for each of the anode and cathode gas flow passages.

There is nothing in Badwal or Ruhl that would teach or suggest combining the device of Badwal with the apparatus of Ruhl to arrive at the present invention. The claim element of a single conductive base sheet having a unique anode gas flow passage geometry on one side and a different unique cathode gas flow passage geometry on the

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Attorney Docket No. DP-302846

opposite side is not found in either Badwal or Ruhl. Ruhl teaches a centrally fed radial fuel cell utilizing micro-channels to tailor the flow distribution of reacting gases within the fuel cell and amongst all the cells in a stack. See Ruhl at Column 2, lines 14-16. Ruhl states at page 6, lines 32-35 that the separator 6 might define the micro channels 26 on either or both of its surfaces. Ruhl does not teach or suggest the present single conductive base sheet having opposing first and second faces, the first face having anode gas flow passages disposed thereon, the anode gas flow passages being configured with a first unique anode gas flow passage geometry comprising a depth and pattern selected to optimize fuel gas flow across the interconnect; and the second face having cathode gas flow passages disposed thereon, the cathode gas flow passages being configured with a second unique cathode gas flow passage geometry that is different from the anode gas flow passage geometry, the cathode gas flow passage geometry comprising a depth and pattern selected to optimize oxidant gas flow across the interconnect.

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Based upon the remarks presented herein, it is submitted that the Examiner's outstanding rejections have been overcome. As a result, Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Should the Examiner have any questions regarding this matter, the Examiner is requested to contact Mr. Paul L. Marshall, who may be reached in the Troy, Michigan area at (248) 813-1214.

If there are any charges with respect to this Response or otherwise, please charge them to Deposit Account No. 50-0831 maintained by Applicants' attorney.

Respectfully submitted,
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